

3.5 Geology, Soils, and Mineral Resources

This section describes potential impacts due to geologic conditions, seismic activity, and soil conditions. This section is based on review of available literature and maps, including geologic hazard maps created by the California Geological Survey, the *Auburn/Bowman Community Plan*, and the *Geotechnical Investigation Report* of the site (**Appendix E** of this EIR).

Environmental Setting

Information regarding soils at the Project site is taken from the *Geotechnical Investigation Report*, dated December 2004. The study is inclusive of the entire Project site and is sufficient to provide adequate geology and soils information for analysis in this EIR.

Geology and Soils

The Project site is underlain by Paleozoic to Mesozoic metavolcanic rocks (commonly referred to as greenstone) and ultramafic rocks (serpentine). The surface of the greenstone typically weathers to reddish clay, clayey, and silty sand, while the soils covering the serpentine weather to a light to moderately dark green silty and sandy clay. Based on the Project site field investigation, the soil overlying the greenstone is typically thicker than that overlying the serpentine. The underlying greenstone and serpentine are relatively high strength. Refer to the Section 3.2 for information relative to potential hazards associated with naturally-occurring asbestos that may be found in these geologic formations.

The Project site slopes generally downhill to the west-southwest towards State Route 49 and consists of a series of flat terraces separated by the Fiddler Green Canal and Wise Canal.

Exploratory test pits excavated as part of the *Geotechnical Investigation Report* indicated the soil varies from approximately 0.5 to 5 feet in thickness and is composed of red to tan sandy clay/clayey sand with residual rock fragments. The materials are typically weak near the surface and grade to relatively competent material between two to five feet below existing grade. The surface soil is underlain by greenstone that varies from completely weathered and sheared to unweathered, hard greenstone. Visual classification of the site soils and Atterberg Limits tests indicate that the soil expansion potential is considered low.

The western portion of the site is generally covered by weathered asphalt pavement, gravel, or concrete. Below the asphalt or gravel and underlying aggregate baserock the soils consist of red, rocky, silty, and clayey sand, which grades to a tan and green moderately weathered to relatively unweathered serpentine.

Outcrops of greenstone exist on-site at the ground surface in the southeast portion of the site, and exposed serpentine lies along a scarp in the west central portion of the Project area.

The *Geotechnical Investigation Report* concluded that the site is suitable for the proposed Project from a geotechnical standpoint, provided that recommendations made in the report are incorporated into the design considerations and the Project plans and specifications. The recommendations are provided in detail in the *Geotechnical Investigation Report*.

Seismicity

Some faulting exists within Placer County. Faults are fractures in the earth's crust across which there has been relative displacement. When the earth moves along a fault, large amounts of energy are released in all directions from the fault, known as an earthquake. Earthshaking occurs in areas near the fault, varying according to distance, magnitude of the earthquake, and the type of intervening geologic material.

According to the *Geotechnical Investigation Report*, there are no known active faults running through or adjacent to the Project site. The site is in a low seismic activity zone, according to Alquist-Priolo zone maps. Information about seismicity and area faults are described by the California Geological Survey (formerly the California Division of Mines and Geology). The California Geological Survey identified the Project site as having a Peak Gravitational Acceleration (PGA) of approximately 0.101 g-force (g) in firm rock, which is considered a very low level of potential ground shaking.¹ The nearest fault zone to the site is the Foothills Fault System. The Foothill Fault Zone extends from around Oroville in the north to east of Fresno in the south and is a complex series of northwest trending-faults that are related to the Sierra Nevada uplift. The activity of this fault zone is not well understood. This fault zone was the source of Oroville's 1975 earthquake and an earlier event in the 1940's. Future earthquakes in the Placer County area have the potential to originate on nearby fault segments in the Foothill Fault Zone and result in ground shaking.²

Mineral Resources

The Project site is not located within or near any active mining operation. The California Geological Survey has designated Mineral Resource Zones (MRZ) in portions of the state that are considered to have potentially significant mineral deposits. The Project site is not within a State-designated MRZ. Since the Project would have no impact on mineral resources, no further analysis of this issue is required.

Regulatory Setting

Regulations and standards related to geology, soils, and seismicity are included in State regulations, County ordinances, and general and specific plans adopted to protect public safety and to conserve open space. The following is a brief summary of the regulatory context under which soils and geologic hazards are managed at the federal, State, and local levels. Agencies with responsibility for

protecting people and property from damage associated with soil conditions and geologic hazards in the Project area are described below.

Building Codes and Standards

The State of California provides minimum standards for structural design and site development through the California Building Standards Code (California Code of Regulations [CCR], Title 24). The California Building Code (CBC) is based on the Uniform Building Code (UBC), which is used widely throughout the United States (generally adopted on a state-by-state or district-by-district basis), and has been modified for California conditions with numerous more detailed and/or more stringent regulations. Where no other building codes apply, Chapter 18 of the UBC/CBC regulates excavation, foundations, and retaining walls, and Appendix Chapter A33 regulates grading activities, including drainage and erosion control, and construction on expansive soils. The County has adopted the 2001 California Building Code, which is based on the 1997 Uniform Building Code. In addition, the County Code contains provisions related to building construction. The County Code has been amended for revisions, consolidations, and reinstatement/clarification of various construction requirements, including revision of administrative requirements and procedures.

The State earthquake protection law (California Health and Safety Code 19100 *et seq.*) requires that structures be designed to resist stresses produced by lateral forces caused by wind and earthquakes. Specific minimum seismic safety requirements are set forth in Chapter 16 of the UBC/CBC. The UBC/CBC identifies seismic factors that must be considered in structural design. It also divides California into two “seismic zones”, Zone 3 and Zone 4, each of which has its own seismic design and construction standards. Zone 4 standards are more stringent than Zone 3 standards, but seismic standards in both zones are more stringent than those generally applied elsewhere in the United States. The Project site is located in Seismic Zone 3.

Installation of underground utility lines must comply with industry standards specific to the type of utility (e.g., National Clay Pipe Institute for sewers and American Water Works Association for water lines). These standards contain specifications for installation and design to reflect site-specific geologic and soils conditions.

Other Federal and State Regulations

Section 3.10 contains a discussion of the National Pollutant Discharge Elimination System (NPDES) permit for general construction. The NPDES permit is an implementation measure for the federal Clean Water Act, and the process is administered by the State Regional Water Quality Control Board (RWQCB). Requirements and conditions associated with the NPDES permit include provisions that reduce the amount of soil erosion that may occur as a result of construction activities.

The Alquist-Priolo Earthquake Fault Zoning Act was passed by the State Legislature in 1972 to mitigate the hazard of surface faulting for structures for human occupancy. Its main purpose is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The law requires the State Geologist to establish regulatory zones known as Earthquake Fault Zones around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and State agencies for their use in planning and controlling

new or renewed construction. Local agencies must regulate most development projects within the Earthquake Fault Zones. The Project site is not included in an Alquist-Priolo earthquake hazard zone.

Seismic Hazard Zones are regulatory zones determined by the California Geological Survey to be prone to liquefaction (failure of water-saturated soil) and earthquake-induced landslides. These are areas where weak soil and/or rock may be present that would result in potentially hazardous conditions for housing and other development. The Project site is not located in a Seismic Hazard Zone.³

Local Policies and Regulations

The *Placer County General Plan* and the *Auburn/Bowman Community Plan* set forth requirements for minimizing geology and soils impacts for new development. The policies of these plans, as applicable to geology and soils are provided below.

Placer County General Plan Policies

Policy 1.K.4 The County shall require that new development incorporates sound soil conservation practices and minimizes land alterations. Land alterations should comply with the following guidelines:

- a. Limit cuts and fills;
- b. Limit grading to the smallest practical area of land;
- c. Limit land exposure to the shortest practical amount of time;
- d. Replant graded areas to ensure establishment of plant cover before the next rainy season; and
- e. Create grading contours that blend with the natural contours on site or look like contours that would naturally occur.

Policy 8.A.2 The County shall require submission of a soils report, prepared by a registered civil engineer and based upon adequate test borings, for every major subdivision and for each individual lot where critically expansive soils have been identified or are expected to exist.

Policy 8.A.3 The County shall prohibit the placement of habitable structures or individual sewage disposal systems on or in critically expansive soils unless suitable mitigation measures are incorporated to prevent the potential risks of these conditions.

Auburn/Bowman Community Plan Policies

Policy B.1.b (3) Require slope analysis maps during the environmental review process or at the first available opportunity of project review, as needed, to assess future grading activity, building location impacts, and road construction impacts.

Policy B.1.b (4) Ensure implementation of the Placer County Grading Ordinance to protect against sedimentation and soil erosion.

Policy B.1.b (6) Developers shall provide adequate drainage and erosion control during construction as described in the Placer County Land Development Manual, Stormwater Management Manual, and Grading Ordinance.

Policy B.2.b (3) Discourage, through precise zoning for large parcel sizes, new development on serpentine formations which require individual wells, septic systems, or water recharge areas.

Policy B.2.b (4) During project review, consider the development limitations of geologic formations.

Methodology

Information to establish geological baseline conditions was compiled from published information and site visits by the preparer of this Draft EIR. Technical reports and information published by the California Geological Survey, the *Auburn/Bowman Community Plan EIR*, and other relevant environmental documents were used to describe existing conditions. The analysis of geologic and soils impacts is qualitative and evaluates the extent to which development activities could affect, or be affected by, known geologic and soils conditions. The significance of impacts is based on the Thresholds of Significance presented in the following section.

The information obtained from the aforementioned sources was reviewed and summarized to establish existing conditions and to identify potential environmental effects. In addition to reviewing available reports, a site reconnaissance of the proposed Project area was conducted to visually confirm landforms, slopes, and general geologic conditions. The preparer of this Environmental Impact Report conducted a peer review of the geotechnical report prepared for this site.

Thresholds of Significance

Impacts would be considered significant if the Project would:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving seismic ground shaking, seismic-related ground failure, landslide, expansive soils, or other geologic or soil-related hazards;
- Result in substantial soil erosion or the loss of substantial topsoil;
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially results in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse;
- Be located on an expansive soil, as defined in the Uniform Building Code, creating substantial risk to property;
- Result in the loss of availability of a known mineral resource that would be of value to the region and residents of the state.

Environmental Impact and Mitigation Measures

Impact GEO-1 Erosion or Loss of Topsoil

The Project site slopes generally to the west-southwest toward State Route 49, and consists of a series of flat terraces separated by the Fiddler Green Canal and Wise Canal. The relatively flat topography of the Project site, along with soils information from the *Geotechnical Investigation Report*, indicates that soils on the site are not subject to excessive soil erosion. However, it is anticipated that surficial grading activities will be required for all portions of the Project site. The estimated volume cut for the Project is 31,000 cubic yards, with cuts up to 13 feet in height. The estimated fill volume for the Project is 34,000 cubic yards, with fills up to eight feet in depth. Thus, the estimated import during construction is 3,000 cubic yards. Site grading would loosen the soils, making them more prone to erosion in the event of rainfall. This is a **potentially-significant** impact.

The *Geotechnical Investigation Report* provides mitigation to ensure that erosion impacts are minimized, and are include in similar mitigation measures required by Placer County. In addition, the Project would be required to obtain a NPDES permit, which would ensure that potential pollutants generated by construction are mitigated (see Section 3.10, Surface Hydrology and Water Quality). The Storm Water Pollution Prevention Plan (SWPPP) for the Project, prepared as part of the NPDES permit process, identifies Best Management Practices (BMPs) for erosion and sedimentation control during construction, including measures for dust control, revegetation, sediment trapping, and stabilization of construction roadways.

Wind erosion may occur during site preparation as a result of loosened soils. Mitigation measures in the Air Quality section of this EIR require watering of the Project site during the construction and grading season to minimize the amount of airborne dust generated by these activities. Additional mitigation measures contained within the Air Quality section of this EIR would ensure that the Project does not experience significant erosion or loss of topsoil during construction. In addition, the following mitigation measures shall be implemented.

Mitigation Measure GEO-1a

In accordance with the Standard Conditions for development projects, as established by the County's Engineering and Surveying Department (ESD), the following measures shall be implemented:

- **All proposed grading, drainage improvements, vegetation, tree impacts and tree removal shall be shown on the Grading Plans and all work shall conform to provisions of the County Grading Ordinance (Section 15.48, Placer County Code) and the Placer County Flood Control District's Stormwater Management Manual. The applicant shall pay plan check fees and inspection fees. No grading, clearing, or tree disturbance shall occur until the Grading Plans are approved and any required temporary construction fencing has been installed and inspected by a member of the DRC. All cut/fill slopes shall be at 2:1 (horizontal:vertical) unless a soils report supports a steeper slope and the Engineering and Surveying Department (ESD) concurs with said recommendation.**

- All facilities and/or easements dedicated or offered for dedication to Placer County or to other public agencies which encroach on the project site or within any area to be disturbed by the project construction shall be accurately located on the Grading Plans. The intent of this requirement is to allow review by concerned agencies of any work that may affect their facilities.
- The applicant shall revegetate all disturbed areas. Revegetation undertaken from April 1 to October 1 shall include regular watering to ensure adequate growth. A winterization plan shall be provided with project Grading Plans. It is the applicant's responsibility to assure proper installation and maintenance of erosion control/winterization during project construction. Provide for erosion control where roadside drainage is off of the pavement, to the satisfaction of the ESD.
- Submit to the ESD a letter of credit or cash deposit in the amount of 110% of an approved engineer's estimate for winterization and permanent erosion control work prior to Grading Plan approval to guarantee protection against erosion and improper grading practices. Upon the County's acceptance of improvements, and satisfactory completion of a one-year maintenance period, unused portions of said deposit shall be refunded to the project applicant or authorized agent.
- If, at any time during construction, a field review by County personnel indicates a significant deviation from the proposed grading shown on the Grading Plans, specifically with regard to slope heights, slope ratios, erosion control, winterization, tree disturbance, and/or pad elevations and configurations, the plans shall be reviewed by the DRC/ESD for a determination of substantial conformance to the project approvals prior to any further work proceeding. Failure of the DRC/ESD to make a determination of substantial conformance may serve as grounds for the revocation/modification of the project approval by the appropriate hearing body.

Mitigation Measure GEO-1b

In accordance with the Engineering and Surveying Department (ESD) Standard Conditions for development projects, the applicant shall prepare and submit with the project Improvement Plans, a drainage report in conformance with the requirements of Section 5 of the Land Development Manual (LDM) and the Placer County Storm Water Management Manual that are in effect at the time of submittal, to the Engineering and Surveying Department for review and approval. The report shall be prepared by a Registered Civil Engineer and shall, at a minimum, include: A written text addressing existing conditions, the effects of the improvements, all appropriate calculations, a watershed map, increases in downstream flows, proposed on- and off-site improvements and drainage easements to accommodate flows from this project. The report shall identify water quality protection features and methods to be used both during construction and for long-term post-construction water quality protection. "Best Management Practice" (BMP) measures shall be provided to reduce erosion, water quality degradation, and prevent the discharge of pollutants to stormwater to the maximum extent practicable.

The following off-site drainage facilities shall be evaluated in the drainage report for condition and capacity and shall be upgraded, replaced, or mitigated as specified by the Engineering and Surveying Department:

- a) Existing culvert at State Route 49.

Mitigation Measure GEO-1c

In accordance with the ESD Standard Conditions for development projects, the applicant shall Submit to the Engineering and Surveying Department (ESD), for review and approval, a geotechnical engineering report produced by a California Registered Civil Engineer or Geotechnical Engineer. The report shall address and make recommendations on the following:

- A) Road, pavement, and parking area design
- B) Structural foundations, including retaining wall design (if applicable)
- C) Grading practices
- D) Erosion/winterization
- E) Special problems discovered on-site, (i.e., groundwater, expansive/unstable soils, etc.)
- F) Slope stability

Once approved by the ESD, two copies of the final report shall be provided to the ESD and one copy to the Building Department for their use. If the soils report indicates the presence of critically expansive or other soils problems which, if not corrected, could lead to structural defects, a certification of completion of the requirements of the soils report will be required for subdivisions, prior to issuance of Building Permits. This certification may be completed on a Lot by Lot basis or on a Tract basis. This shall be so noted in Project Covenants, Codes, and Restrictions (CC&Rs) and on the Informational Sheet filed with the Final Map(s). It is the responsibility of the Project developer to provide for engineering inspection and certification that earthwork has been performed in conformity with recommendations contained in the report.

With implementation of the above mitigation measures, soil erosion impacts are considered **less than significant**.

Impact GEO-2 Earthquake or Other Major Geologic Event

The Project site is located in an area classified as a low seismic activity zone under the Alquist-Priolo Act. The Project is not near any Alquist-Priolo Earthquake Fault Zone, and Placer County is not on the State's Alquist-Priolo Fault Zone Listing⁴. Also, the Project site is not located in a designated Seismic Hazard Zone, indicating that liquefaction and landslides hazards would be insignificant. However, the site's proximity to active faults in the region that could generate significant earthquakes could subject the Project to a potential ground shaking hazard.

The Project site is located within Seismic Zone 3, as set forth in the adopted UBC/CBC. All proposed structures associated with the Project would be required to meet the seismic design standards for Seismic Zone 3. As part of compliance with the locally adopted sections of the UBC/CBC, Project development would be designed to withstand expected seismic forces that could sustain both horizontal and vertical oscillations and net displacement of earth material along faults. The UBC/CBC may require certain engineering methods and flexible utility connections to accommodate warping and distributive deformation associated with faulting, or other methods as deemed appropriate. Compliance with UBC/CBC standards would ensure that impacts associated with ground shaking would be **less than significant**.

Impact GEO-3 Soil Suitability for Development

As described previously above, the Project site is generally considered to be geologically stable for development with low soil expansion potential, based on the geotechnical reports prepared by the Project applicant. Soil types, densities, and subsurface conditions are adequate to support planned construction, and there are no outstanding issues identified in the geotechnical analysis which would indicate the need for mitigation. However, it should be noted that these conclusions were made in a preliminary report, and the report itself states that more recommendations regarding design and construction would be made once final site, grading, and drainage plans are reviewed. Improper consideration and design for site-specific geologic conditions could result in damage and failure of Project facilities and buildings. This is considered a **potentially-significant** impact.

Mitigation Measure GEO-1c, described previously, would reduce potential impacts by requiring a geotechnical engineering report that addresses soil impacts on particular aspects of development. The measure would also require certification of completion of the requirements of the report if any soil problems that could affect structures are identified. Implementation of this mitigation measure would reduce potential impacts related to soil suitability to a level that would be **less than significant**.

Impact GEO-4 Impacts of Construction on Topography and Soils

As previously described, the Project site varies little in its topography. Nevertheless, Project construction would require some alteration to the topography, as pads for residences and infrastructure are installed. However, since the topography has little variation, this alteration is not considered significant. According to tests, the outcrops of greenstone in the southeast portion of the subject site and exposed serpentine that lies along a scarp in the west central portion of the Project area are considered rippable, but may require blasting under certain circumstances. (Refer to Section 3.2 for a discussion of potential impacts associated with naturally-occurring asbestos.) It is recommended that the contractor include a contingency for the blasting of rock. The existing Fiddler Green Canal will need to be replaced with a closed culvert system. The current canal is a concrete-lined channel that currently conveys water. Prior to site grading the canal structure will require removal. If the soil below the concrete is saturated, it should be removed prior to any pipe placement or backfilling. The concrete will likely require removal. These impacts are **less than significant**.

The Project would require some displacement, disruption and compaction of the soil as the Project site is prepared for residential construction. This could cause soil erosion, as discussed in Impact GEO-1. It could also have impacts on drainage, percolation into soils and sedimentation. These impacts are **potentially significant**.

Mitigation Measures GEO-1a, 1b, and 1c, which are described above, address these impacts through the implementation of ESD Standard Conditions designed to reduce impacts on soils. Implementation of these mitigation measures would reduce potential impacts associated with Project construction activities to a level that is **less than significant**.

Notes and References

- ¹ California Division of Mines and Geology. Interactive Ground Motion Map - Centered on 121° W (Longitude); 39° N (Latitude). <http://www.consrv.ca.gov/CGS/rghm/pshamap/psha12139.html>
- ² Placer County. Draft DMA 2000 Multi-Hazard Mitigation Plan for Placer County. November 18, 2004.
- ³ California Division of Mines and Geology. *Natural Hazards Disclosure: Seismic Hazard Zones*. <http://www.consrv.ca.gov/dmg/shezp/disclose.htm>
- ⁴ California Division of Mines and Geology. *Regulatory Hazards Zone Disclosure Database*. <http://www.consrv.ca.gov/cgs/rghm/ap/affected.htm>